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Evaluation and projection of long period return values of extreme daily precipitation in the CMIP5 and CMIP6 models

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Using a non-stationary Generalized Extreme Value statistical method, we calculate selected extreme daily precipitation indices and their 20 year return values from the CMIP5 and CMIP6 climate models over the historical and future periods. We evaluate model performance of these indices and their return values in replicating similar quantities calculated from multiple gridded observational products. Difficulties in interpreting model quality in the context of observational uncertainties are discussed. Projections are framed in terms of specified global warming target temperatures rather than at specific times and under specific emissions scenarios. The change in framing shifts projection uncertainty due to differences in model climate sensitivity from the values of the projections to the timing of the global warming target. At their standard resolutions, we find there are no meaningful differences between the two generations of models in their quality or projections of simulated extreme daily precipitation.